RF/ER-96-0051

KAISER•HILL
COMPANY

Completion Report for the Source Removal at Trenches T-3 and T-4 (IHSS's 110 and 111.1)

RMRS Rocky Mountain Remediation Services, L.L.C.
...protecting the environment

September 23, 1996
Revision 2

COMPLETION REPORT

for the

SOURCE REMOVAL

at

TRENCHES T-3 AND T-4

(IHSS's 110 and 111.1)

September 23, 1996

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COMPLETION REPORT for the SOURCE REMOVAL at TRENCHES T-3 and T-4 (IHSS's 110 and 111.1)

TABLE OF CONTENTS

Section		Page
1.0	INTRODUCTION	1
2.0	EXCAVATION AND TREATMENT PROCESS DESCRIPTION	1
3.0	VERIFICATION OF SOURCE REMOVAL	3
4.0	VERIFICATION OF TREATMENT PROCESS	8
5.0	RADIOLOGICAL ANALYSIS	8
6.0	DEBRIS AND OTHER WASTE STREAM DISPOSITION	10
7.0	SITE RECLAMATION	12
8.0	DEVIATIONS FROM THE PAM	12

ACRONYMS

BQL	Below Quantitation Limit
CDPHE	Colorado Department of Public Health and Environment
CPM	Counts Per Minute
DNAPL	Dense Non-aqueous Phase Liquid
DOE	Department of Energy
EPA	Environmental Protection Agency
FIDLER	Field Instrument for the Detection of Low Energy Radiation
GAC	Granular Activated Carbon
HEAF	High Efficiency Air Filter
HEPA	High Efficiency Particulate Air
IHSS	Individual Hazardous Substance Site
LNAPL	Light Non-aqueous Phase Liquid
MH	McLaren Hart
PCE	Tetrachloroethene
PPE	Personal Protective Equipment
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RMRS	Rocky Mountain Remediation Services
TCE	Trichloroethene
TDU(s)	Thermal Desorption Unit(s)
VOC(s)	Volatile Organic Compound(s)

1.0 INTRODUCTION

The purpose of the source removal conducted at Trenches T-3 and T-4 at the Rocky Flats Environmental Technology Site (RFETS) was to remove contamination sources of volatile organic compounds (VOC) from the trenches which were contaminating the groundwater. Trench T-3, also known as Individual Hazardous Substance Site (IHSS) 110, was used from 1964 to 1966, and Trench T-4, also known as IHSS 111.1, was used from 1966 to 1967 for disposal of sanitary sewage sludge contaminated with low levels of uranium and plutonium. Miscellaneous debris, primarily crushed drums which may also have been contaminated with uranium and plutonium, was placed in the trenches as well.

The project was authorized by the Proposed Action Memorandum (PAM) for the Source Removal at Trenches T-3 and T-4, Revision 2, dated March 28, 1996. Approximately 3,796 cubic yards of contaminated soil and debris were removed from the trenches and processed using thermal desorption to remove VOCs, primarily carbon tetrachloride, trichloroethene (TCE), and tetrachloroethene (PCE). The excavation of Trench T-3 was approximately 136 feet long, 18 to 24 feet wide, and approximately 15 feet deep, and included 1,706 cubic yards of material. The excavation was completed July 3, 1996, and treatment of Trench T-3 material was completed July 11, 1996. The excavation of Trench T-4 was 148 feet long, 19 to 22 feet wide, and approximately 12 feet deep, except where the excavation proceeded to bedrock at 26 feet, and included 2,090 cubic yards of material. The excavation was completed August 14, 1996, and treatment of the T-4 material was completed August 19, 1996.

This completion report discusses the project in general and the analytical methods used to demonstrate achievement of the excavation cleanup values and the treatment performance standards specified in the PAM. Additionally, this closure report demonstrates compliance with the negotiated agreement, dated May 30, 1996, between DOE, EPA, and CDPHE on meeting the Tier I subsurface soils action levels as proposed by the Rocky Flats Cleanup Agreement (RFCA) working group, documented in Appendix A, by a faxed copy of the agreement.

2.0 EXCAVATION AND TREATMENT PROCESS DESCRIPTION

RFETS steelworkers performed the excavation of the trenches and reclamation of the treatment area, and a subcontractor, McLaren Hart (MH) Environmental Engineering Corporation, performed the thermal desorption treatment. The excavation crew removed sufficient material from the trenches (approximately 100-200 cubic yards per day) using a tracked excavator and front-end loader to keep the thermal desorption process operating on a continuous basis. Each load of excavated material was screened using a Field Instrument for the Detection of Low Energy Radiation (FIDLER). Material with readings greater than 5,000 counts per minute (cpm) was segregated, stockpiled, and treated separately, as described in Appendix 4 of the Field Sampling Plan. Because the permissible exposure limits for the contaminants of concern were so

low, the work was conducted in level B personnel protective equipment (PPE). This posed heat stress concerns for both the excavation and thermal desorption crews, which were mitigated by using ice vests and limiting the individual stay time of the workers in the PPE.

The thermal desorption crews worked 24 hours per day, five days per week, treating the contaminated material. The treatment process involved six low-temperature thermal desorption units (TDUs), each holding approximately five cubic yards of material. The contaminated soils and debris were loaded into the TDUs on a batch basis, then heated using propane fueled infrared heaters for at least 30 minutes after attaining a 180°F soil temperature. These treatment parameters were developed in the field using processed material and analytical results, and assured compliance with the PAM performance standards. A vacuum was drawn through the TDUs to reduce boiling points and remove the liberated VOCs. The airstream was passed through a high efficiency air filter (HEAF) and a high efficiency particulate air (HEPA) filter to remove particulates. The airstream was then cooled in a condenser to approximately 40°F, causing the VOCs to return to liquid form for removal. The airstream then passed through a granular activated carbon (GAC) unit for polishing. All treatment lines were discharged at a single stack and monitored to verify that appropriate discharge standards were met.

The condensate removed from the condenser was collected in a 6,000 gallon double walled tank, then passed through an oil/water separator to remove any dense non-aqueous phase liquids (DNAPL) and light non-aqueous phase liquids (LNAPL). Approximately 40 gallons of DNAPL and approximately 25 gallons of LNAPL were collected in drums. The vast majority of the condensate was an aqueous phase liquid, primarily water. This was transported to the Consolidated Water Treatment Facility (Building 891) for processing.

After treatment, the soils were sampled according to the Field Sampling Plan. Water was used for dust suppression as each batch of material was removed from the TDUs and segregated until verification was obtained demonstrating compliance with the performance standards stipulated in the PAM. If a particular batch failed to meet the performance standards, the batch was re-treated and re-sampled. Once the analytical results showed the treatment was acceptable, the individual batches were moved into the treated stockpile. A dust suppression agent, Concover™, was sprayed on the treated soils to control dust and prevent erosion. At least one radiological confirmation sample per 100 cubic yards of soil was taken from the treated stockpiles. For the segregated soils which exceeded 5,000 cpm from the FIDLER screen, the radiological sampling rate was increased per radiological engineering direction. These radiological confirmation samples were used to determine whether or not the soils met the Tier I and Tier II action levels agreed upon for this project. The soil remained in the treated stockpile until the trench excavation was completed. Once trench verification samples indicated the excavation had achieved the cleanup values stipulated in the PAM, and radiological confirmation samples confirmed the compliance with the Tier I action levels, the treated soils were replaced in the trenches.

At the conclusion of the project, the stockpile and working areas were sampled and scraped to remove residual contamination and the material was treated in the TDU. The work areas and trenches were regraded and seeded to return them to a condition comparable with the surrounding environment.

3.0 VERIFICATION OF SOURCE REMOVAL

The objective of the excavation was to remove the source material from the trench. This required excavating until soil concentrations in the trench were below the cleanup values listed in Table 1. These values were specified in the PAM and in the ALF-Attachment 4 of RFCA. At the completion of the excavation, each trench was subdivided into 16 grids for sampling purposes, as described in the Field Sampling Plan for the Source Removal at Trenches T-3 and T-4. The

Table 1. Excavation Cleanup Values and TDU Performance Standards

Contaminant	Excavation Cleanup Values (ppm)	TDU Performance Standards (ppm)	Detection Limit (ppm)
1,1,1-TCA	378	6.0	0.6
1,1-DCE	11.9	6.0	0.6
1,2-Dichloroethane	6.33	6.0	0.6
1,2-Dichloroethene	9.51	-	0.62
Acetone	-	160	1.2
Benzene	-	10	0.6
Carbon tetrachloride	11	6.0	0.6
Chloroform	152	6.0	0.6
Ethylbenzene	1760	10	0.6
Methylene chloride	-	30	0.6
PCE	11.5	6.0	0.6
Toluene	2040	10	0.6
TCE	9.27	6.0	0.6

samples were taken from the walls and floor of the excavated trench using the excavator so as not to require a person to enter the trench. The excavator bucket was decontaminated prior to the sampling event, then a sample was taken from the middle of the bucket-full of soil removed from the sampling location in the trench.

The results of the excavation verification samples are summarized in Appendix B. The actual analytical results are presented in Appendix E. In the tables in Appendix B, the contaminants of concern with associated cleanup values are presented along the top of the tables. The individual samples and their respective analytical results are listed in each column. Split samples were sent off-site to an independent lab for quality control and were not available at the time of this report.

Figure 1 shows the location of Trenches T-3 and T-4 and Figures 2 and 3 show the sampling grids used for the two trenches. All the contaminant concentrations remaining after the source removal from Trench T-3 were below the cleanup values. Three of the initial samples from Trench T-4 exceeded the cleanup values. These samples came from grids 29, 30, and 32. In accordance with the SAP, theses three grids were then subdivided into four grids each for further sampling so as to increase the level of confidence of having accurately characterized the primary grid. If any one of the subdivided grids failed, the entire primary grid was treated as having failed. Excavation continued in these three primary grids, sampling the subdivided grids periodically to determine remaining concentrations. The subsequent samples from these three primary grids, as represented by sample numbers TR00040RM through TR00055RM, continued to show concentrations above the cleanup values. Bedrock was encountered at a depth of approximately 26 feet. Excavation ended at this point in accordance with the PAM and with concurrence from DOE, EPA, and CDPHE as documented in Appendix A, Telecopy Transmittal of Teleconference Minutes dated August 14, 1996. At this depth final samples from the subdivided grids were collected. Primary grids 29 and 30 were below the cleanup values. Primary grid 32 had a concentration of 22 ppm TCE, which is above the cleanup value of 6.0 ppm, in one of the subdivided grids (sample number TR00053RM).

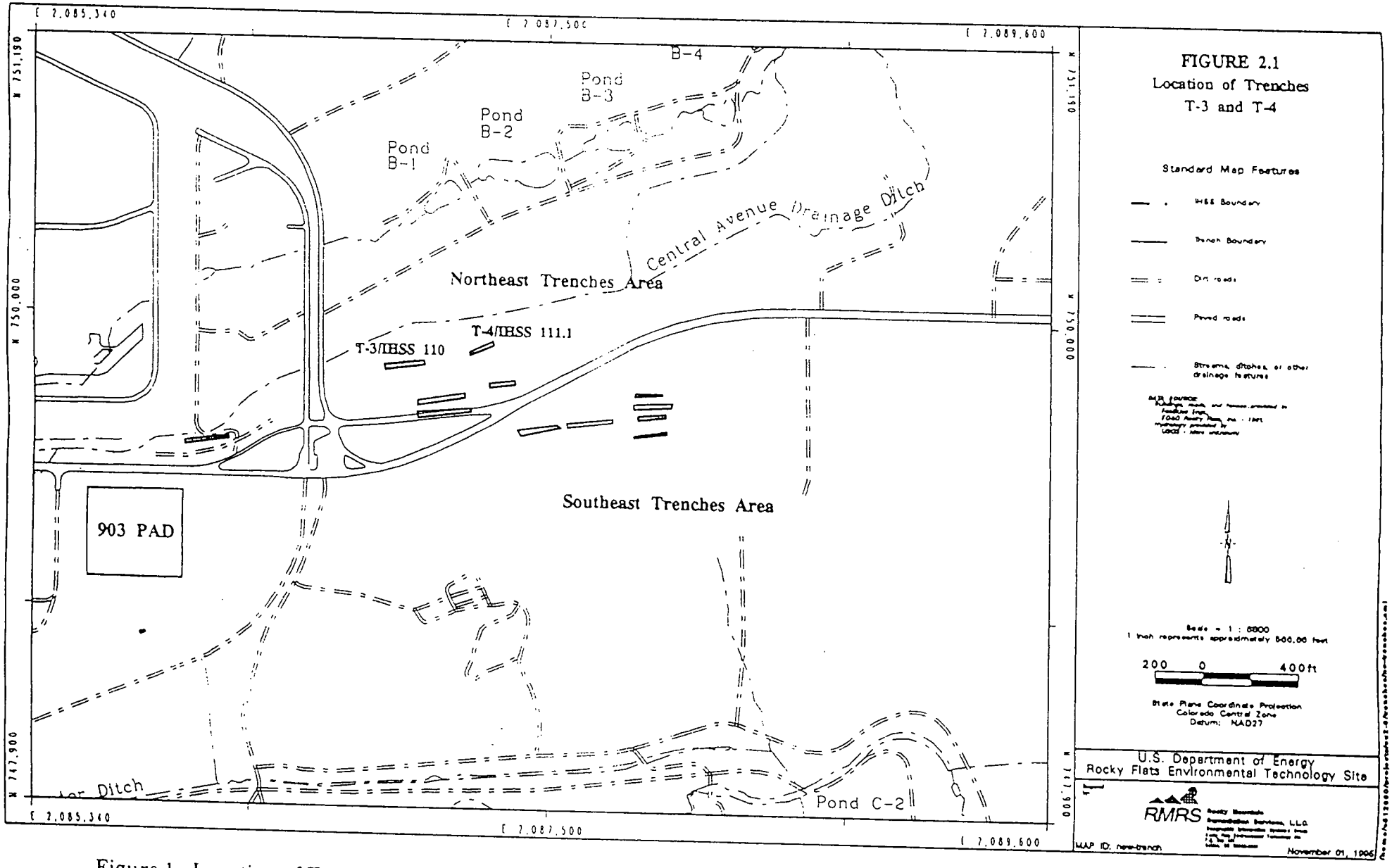
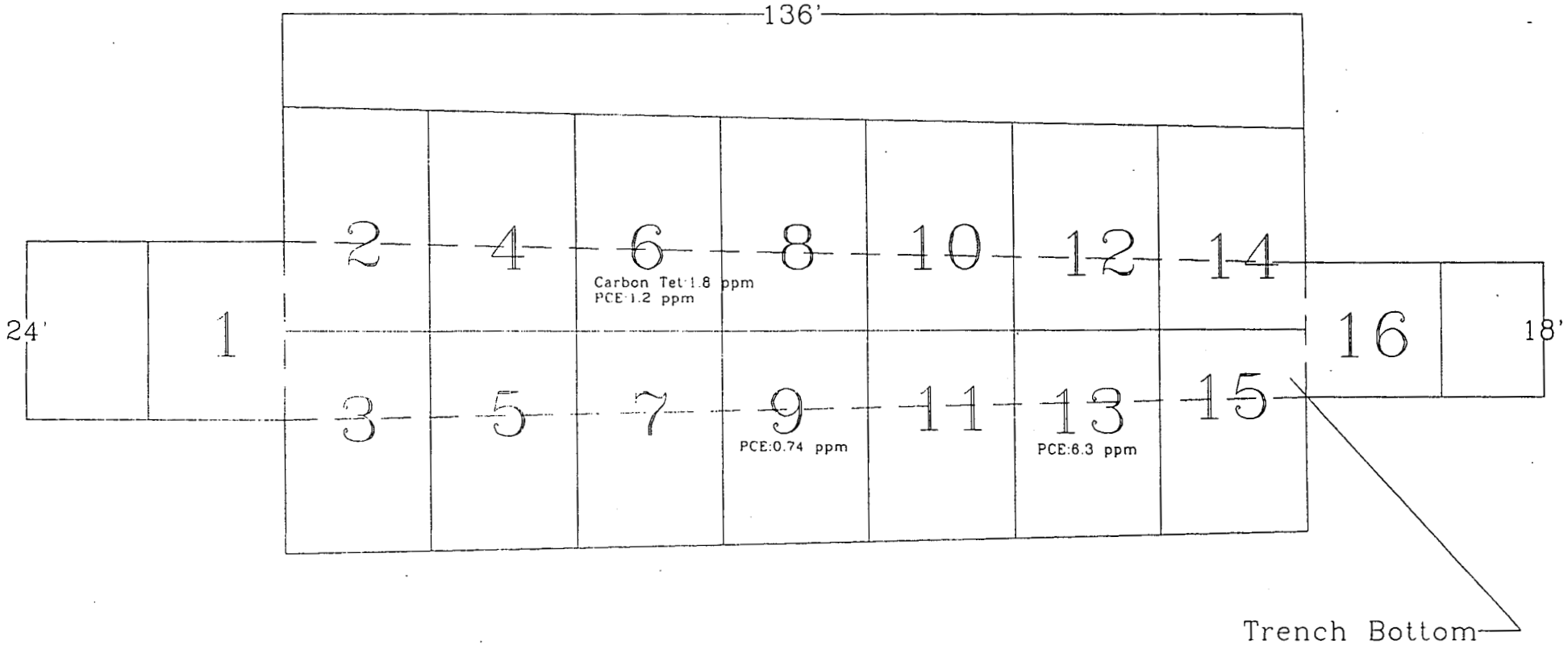


Figure 1. Location of Trenches T-3 and T-4



NOTE: Values are Below Detectable Level (BDL) unless stated.
Detection Levels are:
1,1,1 Trichloroethane: 0.60 ppm
1,1 Dichloroethene: 0.60 ppm
1,2 Dichloroethane: 0.60 ppm
1,2 Dichloroethene: 0.60 ppm
Carbon Tetrachloride: 0.60 ppm
Chloroform: 0.60 ppm
Ethylbenzene: 0.60 ppm
Perchloroethene: 0.60 ppm
Toluene: 0.60 ppm
Trichloroethene: 0.60 ppm

LEGEND:
TR.....RM are RFEDS sample numbers

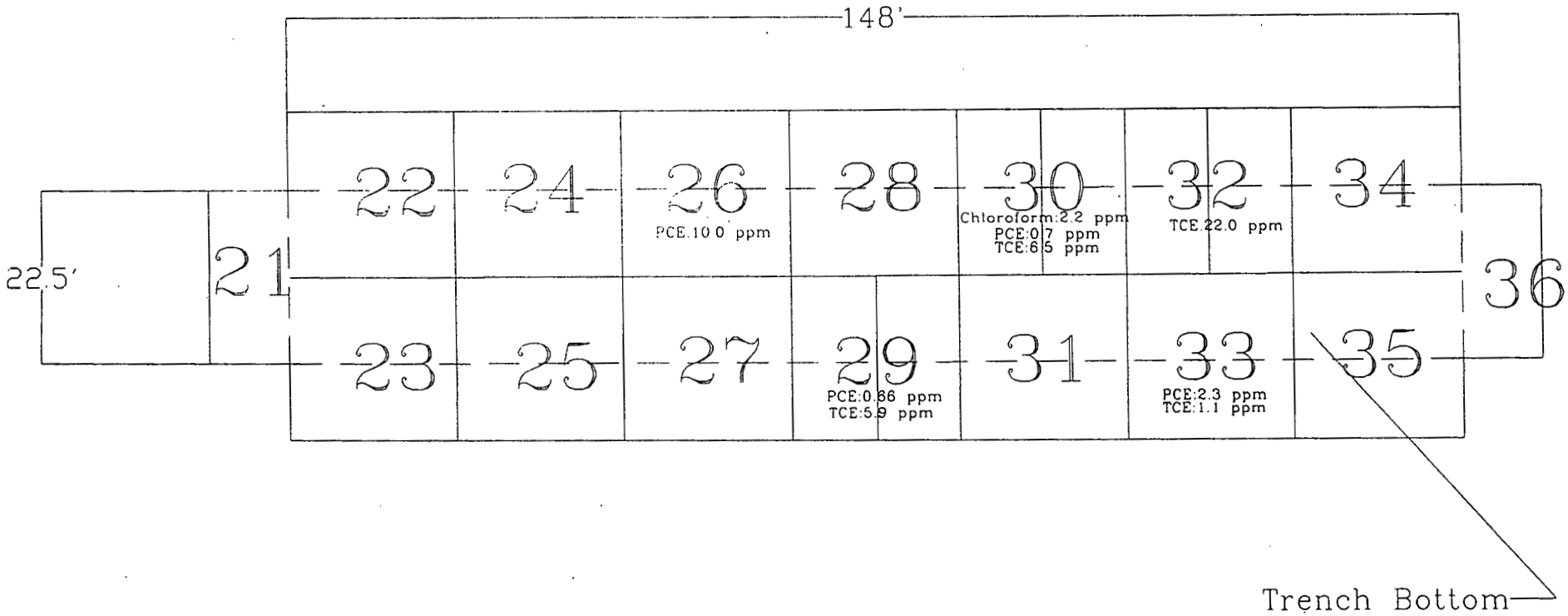
N

REV. NO.	DATE:	FILENAME:
A	8/15/96	T3final.dwg

T-3 Excavation Bottom Sample Results

DRWN:	CHKD:	CHARGE NO.:
RMH	HS	951878

Figure 2. T-3 Sampling Grids



NOTE: Values are Below Quantification Limit (BQL) unless stated.
Highest remaining levels are shown.
Quantification Limits are:
1,1,1 Trichloroethane: 0.60 ppm
1,1 Dichloroethene: 0.60 ppm
1,2 Dichloroethane: 0.60 ppm
1,2 Dichloroethene: 0.60 ppm
Carbon Tetrachloride: 0.60 ppm
Chloroform: 0.60 ppm
Ethylbenzene: 0.60 ppm
Perchloroethene: 0.60 ppm
Toluene: 0.60 ppm
Trichloroethene: 0.60 ppm

LEGEND:
TR.....RM are RFEDS sample numbers

N

REV. NO.	DATE:	FILENAME:
A	8/16/96	T4final.dwg

T-4 Excavation Bottom Sample Results

DRWN:	CHKD:	CHARGE NO.:
RMH	HS	951878

Figure 3. T-4 Sampling Grids

4.0 VERIFICATION OF TREATMENT PROCESS

The performance standards stipulated in the PAM are listed in Table 1. Process verification samples for the treated soils were taken from each batch as it was removed from the TDUs. A backhoe was used to remove a load of soil from the TDUs and a sample was taken from the interior of the bucket load or directly from the TDU during unloading operations. The analytical results of these samples are summarized in Appendix C. The actual analytical results are presented in Appendix E. According to the Field Sampling Plan, every TDU was sampled until a baseline was established where MH determined the optimal treatment time and temperature. Sampling frequency decreased from sampling every TDU to collecting one sample per 30 cubic yards of treated material. There were a total of 6 individual TDUs which failed to meet the performance standards. All six failures occurred during the initial "shake down period" before the baseline was established, and as such, did not represent a full 30 cubic yard batch, but only the separate TDU. During this shake down, the temperature and treatment times of the individual TDUs were being modified in order to establish the optimum treatment parameters. All of the pre-baseline treatment loads which originally failed the performance standards were retreated in subsequent loads, which in turn met the performance standards. All post-baseline samples met the treatment performance standards.

5.0 RADIOLOGICAL ANALYSIS

Tier I action levels are listed in Table 2 and were agreed upon by CDPHE, EPA, and DOE for this project. The values in Table 2 are those agreed to as of May 30, 1996 and may differ from the final action levels in RFCA. These values are not threshold values, but represent a soil concentration that could present a residential dose limit. Each radionuclide present has a measured soil concentration which is divided by the action level presented. The ratios added together must not exceed 1.0 in order to comply with the Tier I requirements.

In order to determine if the treated soils met the agreed upon Tier I action levels for radiological contamination, the soils were initially screened using a FIDLER, then analyzed using gamma spectroscopy after treatment was completed. Each bucket load of the front end loader was screened as the material was moved into the contaminated material stockpile. Any material reading above 5,000 counts per minute was segregated into a separate pile. This was a slightly more conservative value than the 6,600 counts set forth in Appendix 4 of the Field Sampling Plan and was used for ease of operation in reading the FIDLER. Both the non-segregated and segregated soils were treated by the TDU, but were kept separate throughout the treatment process. Soils below the 5,000 cpm screening level were placed in the VOC treated stockpile, while the other material was placed in a radiologically segregated, VOC treated stockpile. Both

stockpiles were sampled for radionuclide analysis at the completion of treatment. At the conclusion of the project, 1,706 cubic yards of soil from T-3 and 2,090 cubic yards of soil from T-4 had been treated. Of this material, approximately 500 cubic yards had been segregated as potentially radiologically contaminated material. In accordance with the Field Sampling Plan, at least one radiological sample per 100 cubic yards of treated material was taken from the treated stockpiles. The stockpiles were marked off into approximately equal grids, and samples were taken for isotopic characterization using gamma spectroscopy. The results of the isotopic characterization are presented in Appendix D and indicate that all of the soil, including the material initially segregated, met the Tier I action levels. Furthermore, all but approximately 250 cubic yards of soil met the Tier II values as well.

After discussions with DOE, EPA, and CDPHE, it was decided that all of the soils could be replaced in the trenches, but that the 250 cubic yards which exceeded the Tier II values should be kept together and delineated in the trench in the event it becomes necessary to exhume it in the future. This decision is documented in a letter from Steve Slaten, DOE, to Tim Rehder, EPA, and included in Appendix A. The segregation and demarcation was accomplished by placing 60 feet of geotextile grid liner as a marker at approximately eight feet deep at the west end of Trench T-4. The 250 cubic yards which exceeded Tier II were then placed on top of the marker, and a second layer of the geotextile grid was placed over the soils. The top of this marker was approximately 4 feet below the trench surface. The marked off soils were then covered with the other treated T-4 material, which met the Tier II values, and top soil.

TABLE 2. Tier I Action Level for Residential Exposure

Radionuclide	Action Level (pCi/g)
Americium-241	229
Plutonium-238	2140
Plutonium-239	2001
Plutonium-240	2007
Plutonium-241	21530
Plutonium-242	2110
Uranium-234	2042
Uranium-235	136.8
Uranium-238	613.9

6.0 DEBRIS AND OTHER WASTE STREAM DISPOSITION

The debris (drums, wood, concrete blocks, etc.) excavated from Trenches T-3 and T-4 was either treated by the TDU, or screened/sampled to verify that it was free from volatile organic contamination. Approximately 200 cubic yards of material, primarily crushed drums, treated by the TDU were crushed for further size reduction and placed in six roll-off containers for storage at the T-3/T-4 area of contamination until the material can be shipped off-site for disposal. The remaining debris (PPE, filter material, sections of duct work which could not be decontaminated, and plastic used during the project) was placed in another roll-off container and will likewise be stored at the T-3/T-4 area of contamination pending off-site shipment.

The intent is to ship the largest volume of waste from this project off-site as low-level waste. This waste is composed of the thermally treated crushed drums. In order to ship this debris off-site as strictly low-level waste, an equivalency determination has been sought from the EPA in accordance with 40 CFR 268.42(b). Approval of the thermal desorption as an equivalent technology is important because it will allow the treated debris to be disposed in the low-level waste disposal cell at Envirocare of Utah, Inc. This results in a five-fold reduction in cost on a per cubic foot basis over the disposal as treated, mixed waste debris. A proposal was submitted to EPA in April 1996 soliciting an equivalency determination for acknowledging treatment of the VOC contaminated drums via low-temperature thermal desorption. Although EPA Headquarters is considering the proposal, an equivalency determination has yet to be granted at the time of this report.

Additionally, the shipment of low-level waste debris to Envirocare is hampered by the need for a waiver from DOE-HQ for the DOE Order 5820.2A which prohibits the shipment of low-level waste to a commercial facility. DOE-RFFO has requested the waiver from DOE-HQ and, at the time of this report, is awaiting the approval.

Once these two issues are resolved, the waste will be characterized in accordance with the disposal facility's waste acceptance criteria.

Additional waste generated during the project are summarized in Table 3.

TABLE 3. Summary of Waste Generated by the T-3/T-4 Project

Waste	Approximate Volume	Storage Type(s)	Class	Storage Location	Planned Disposal
Treated Crushed Drums	120 yd^3	6 roll-off containers	Low-level	T-3/T-4	Envirocare
Miscellaneous debris	20 yd^3	1 roll-off container	Low-level	T-3/T-4	Envirocare
Radiological Soils	36 yd^3	2 roll-off containers	Low-level	T-3/T-4	Envirocare
Radiological Soil/Debris	16 yd^3	3 waste crates and 2 half crates	Low-level	B664	Incineration*
Untreated Debris (unfit for TDU treatment)	8 yd^3	2 waste crate	Low-level Mixed	RCRA Unit 13	Incineration*
GAC	18,000 lbs	7 waste crates and 10 drums	Low-level Mixed	RCRA Units 1 & 13	Incineration*
Soil Mixed with GAC	7 yd^3	2 waste crates	Low-level Mixed	RCRA Unit 13	Incineration*
Condenser Sediment	250 gal	5 drums	Low-level Mixed	RCRA Unit 13	Envirocare
DNAPL	40 gal	1 drum	Low-level Mixed	RCRA Unit 13	Incineration*
LNAPL	25 gal	1 drum	Low-level Mixed	RCRA Unit 13	Incineration*

*Waste Experimental Reduction Facility at the Idaho National Engineering Laboratory or Oak Ridge Facility

During packaging of the drum carcasses, one to two pounds of a black powder was released from a drum and spread over a small work area. This material was found to exhibit radioactive

properties. Two roll-off containers and 2 waste crates were used to containerize soil contaminated with this material.

7.0 SITE RECLAMATION

At the conclusion of the project, the area around the TDUs, the traffic areas, and the contaminated material stockpile areas were sampled for VOC contamination and scraped to remove residual contamination. This material was treated by the TDU and ultimately placed in Trench T-4 as backfill. The TDU was demobilized. The work areas were then surveyed for radiological contamination. Any hot spots were removed. Those soils which met the release criteria were placed on the trenches. The rest was placed into two roll-off containers and three waste crates. The work areas were re-graded and seeded. The T900C and T900D trailers were left in place, as was the temporary power substation, the propane gas line, and the condensate tanks. The corners of both trenches were also surveyed and the coordinates are listed in Table 4.

TABLE 4. Coordinates of Trench Corners

CORNER	NORTHING	EASTING
NW-T3	749793	2086807
NE-T3	749818	2086976
SE-T3	749801	2086977
SW-T3	749764	2086813
NW-T4	749859	2087147
NE-T4	749915	2087315
SE-T4	749889	2087318
SW-T4	749837	2087156

8.0 DEVIATIONS FROM THE PAM

The PAM states that the excavated material would be placed in roll-off containers pending treatment. This was not done. Instead, two stockpile pens were built to hold the material awaiting treatment. Prior to beginning the project, the top soil of the contaminated stockpile area was removed and stockpiled outside the treatment area. A shallow lined gravel drain which discharged to a sump was constructed around the two pens. This drain collected stormwater

runoff from the stockpiled soil. The collected water was pumped into two storage tanks, then transported to the Consolidated Water Treatment Facility (Building 891) for treatment. Tarps were used to cover the stockpiled material to control dust and to prevent precipitation from leaching through the contaminated stockpiles. The design of the contaminated stockpile pens was reviewed with DOE, EPA, and CDPHE before construction.

Similarly, the PAM states that the treated material would be placed in clean roll-off containers and the containers would be sampled for performance verification. Instead, the process verification samples were taken according to Field Sampling Plan, which called for the sample to be taken either directly from the TDU, or from the loader bucket during unloading operations. The treated material was then placed directly on the ground pending sample analysis. The ground was surveyed both before and after the project to assure no contamination was left on the ground from the stockpiles.

Part way through the project it became necessary to change the batch numbering system. Although this system was not detailed in the PAM, the sample records clearly show the numbering change and an explanation is needed. A single batch consisted of 30 cubic yards of material. Each TDU contained 4.93 cubic yards. A batch originally consisted of one load from each of the six TDUs. The problem was that the TDUs heated at different rates. The result was that TDU number 3, for instance, would reach the designated treatment temperature much faster than TDU number 6, and number 6 soon fell behind the batch grouping. To rectify this situation, the batch numbering sequence was changed from representing one load of each of the six TDUs, to representing six complete loads through each individual TDU. This had the added benefit of checking the performance of each TDU instead of relying on random determinations being spread across the six units. This numbering sequence change can be seen in the Process Verification Sample Record in Appendix C. The batch numbers change from a single number to a dashed numbering system, such as 4-38-4. The first number in the dashed system represents the individual TDU. The second number after the dash represent the run number placed in that TDU. The third number represents the sequential load of the run which was sampled.

A soil concentration based on an annual site-wide radiation dose of 85 mrem (the Working Group's proposed Tier I subsurface soils action level) shall be used as a temporary "putback" level for excavated soils from Ryan's Pit and as a temporary putback level for soils excavated as part of the accelerated actions at Trenches T-3 and T-4.

Neither the Action Levels for radionuclides in soils nor the "putback" levels for replacement of soils into excavated areas have been presented for public review and comment and can not, accordingly, be finalized at this time. Both the Action Levels and the "putback" levels will be presented for public review by July 15, 1996 and a 30 day comment period will be initiated at that time. These values will be incorporated into RFCA; or, finalized as addenda or modifications to RFCA if RFCA is finalized first. Final approval of RFCA shall not be delayed pending resolution of these Action Levels and / or "putback" levels.

If values more conservative than those which will be derived from an annual site-wide radiation dose of 85 mrem are ultimately selected as the "putback" levels for replacement of soils into excavated areas by the Parties to this Agreement, then the soils replaced into Ryan's Pit and Trenches T-3 and T-4 will be removed and addressed by future remedial actions.

The temporary "putback" level does not represent a "free-release" number. Residually contaminated soils must still meet the Tier II levels of protection, in accordance with the Action Levels Framework as it will be finalized for radionuclides in soils.

The Parties shall prepare a joint statement explaining this temporary decision in terms of the contaminants to be targeted in these Accelerated Actions, proposed Action Levels for radionuclides, the need for an intermediate decision at this time, the relative costs of alternatives (including cancellation or postponement of the existing contract, continued storage, and offsite disposal), relative risks, and environmental benefit.

Agreed by the Undersigned, May 30, 1996:

Tom Looby
Director, Office of Environment
Colorado Department of Public
Health and Environment

Mark Silverman
Manager, Rocky Flats
Environmental Technology Site
United States Department of Energy

for Jack McGraw
Acting Regional Administrator
United States Environmental
Protection Agency, Region VIII

Jessie Roberson
Manager-Designee, Rocky Flats
Environmental Technology Site
United States Department of Energy

0410CLE.wp

14 August 1996

TELECOPY TRANSMITTAL

TO: Ann Sieben, fax x6406

FROM: Ann Tyson

SUBJECT: **Teleconference Minutes on Trench T-4 Remediation; 13 August 1996; 9:00 am**

Teleconference Members: Ann Sieben, Shaun Garner, Laura Brooks, John Rampe, Steve Slaten, Carl Spreng, Ann Tyson

The teleconference was conducted to discuss the status of the remediation of Trench T-4. Excavation had reached depths of approximately 20 to 21 feet in areas of the trench which was directed at removing a plume of trichloroethylene and tetrachlorethylene. On Monday, 12 August, two geologists confirmed excavation had encountered bedrock. In some areas of the trench, up three to five feet in depth of the bedrock had been excavated in an effort to remove the volatile organic contamination to the action levels stipulated in the PAM. To direct the excavation, the field crew had begun using head space analysis on excavated soils to determine whether sufficient contaminated soils had been excavated.

Two weeks ago when the limits of the former trench boundary had been encountered, the project manager expected that the volatile organic contaminated soils had been completely removed. However, when the confirmation samples were collected from the base of the trench, three areas within the trench failed to meet the cleanup values identified in the PAM. Excavation continued in the trench. When samples were collected again on the 7 August, the three sample grids failed for either trichloroethylene (TCE) and tetrachloroethylene (PCE). The results indicated concentrations at 100 ppm PCE and 30 ppm TCE. (A map of the trench and failed grids is attached.) Additional soils were excavated Thursday and Monday until it was confirmed that the depth of excavation had reached bedrock.

Due to safety concerns and limitations of the excavation equipment, the KH team expressed their decision to curtail the excavation as the PAM (March 28, 1996, Rev. 2) allows. On page 19, section 3.2, "excavation will continue until soil concentrations are below cleanup standards or excavation encounters bedrock or groundwater."

All parties (including DOE, EPA, and CDPHE) agreed with the curtailment of the trench excavation due to the circumstances. It was believed that the source material had been captured during the removal process. Although unavailable for the teleconference, Mr. Tim Rehder, EPA, had contacted Mr. John Rampe earlier in the morning to convey his

agreement to curtail excavation of Trench T-4 based on the circumstances. He concurred that the majority of the source material had been captured.

Samples were agreed to be collected of the targeted grids following the telephone conversation and analysis results would be transmitted to the conversation members as soon as the data was available. It was also agreed that the grid that exceeded the action level along the vertical wall of the trench would be excavated further to remove the contaminated material above the action level. Treated soils from Trench T-3 would be used to backfill Trench T-4 to achieve a safe configuration.

Analytical results from samples collected 13 and 14 August showed only one failed sample at 22 ppm TCE, and it was collected from the base of the trench. The cleanup value is 9.27 ppm.

If you have any questions regarding these minutes, please call me.

Department of Energy

ROCKY FLATS FIELD OFFICE
P.O. BOX 928
GOLDEN, COLORADO 80402-0928

FILE COPY

SEP 10 1996

96-DOE-07980

Mr. Tim Rehder
U.S. Environmental Protection Agency, Region VIII
ATTN: Rocky Flats Project Manager, 8HWM-RI
999 18th Street, Suite 500, 8WM-C
Denver, Colorado 80202-2405

Dear Mr. Rehder:

The purpose of this letter is to confirm agreements reached regarding disposition of soils excavated from Ryan's Pit and from Trenches T-3 and T-4 at the Rocky Flats Environmental Technology Site (RFETS). As you recall, these agreements were reached during a meeting held on August 28, 1996, during a conference call on the morning of September 4, 1996, and during subsequent conversations between yourself and Mr. Carl Spreng of the Colorado Department of Public Health and Environment (CDPHE).

Regarding the Ryan's Pit soils, data were presented at the August 28 meeting demonstrating that these soils, now stored in eleven roll-off containers at RFETS, contained levels of radionuclides below the proposed Tier II soil action levels. These data are the results of a statistically valid soil sampling program and a summary is enclosed. Based upon these data, parties at the August 28 meeting agreed that the Ryan's Pit soils would be returned to the excavation; Kaiser-Hill and RMRS plan to accomplish this in mid-September.

Kaiser-Hill and RMRS presented radiological sampling data for the majority of the soils excavated from T-4 (that is, those soils that did not show radiological levels above background when surveyed with field instruments) during the September 4 conference call. These data (enclosed) showed levels of radiological constituents that were below the proposed Tier II soil action levels. As per the Ryan's Pit soil, all parties agree that these soils could be returned to the excavation; Kaiser-Hill and RMRS plan to have this accomplished by September 9, 1996.

Considerable discussion took place both on August 28 and September 4 regarding the appropriate disposition of T-3 and T-4 soils that exhibited radiological concentrations above background (when surveyed with field instruments during the excavation), and which were segregated from other excavated soils. Sampling results indicate that about 250 cubic yards of this soil, has radiological concentrations that exceed the proposed Tier II soil action level, but which does not exceed the proposed Tier I soil action level. The parties have agreed to the following course of action for these soils:

- those soils that exhibit radionuclides below the proposed Tier II action level will be segregated and returned to the excavation per the Ryan's Pit and T-4 soils discussed above; and,

• those soils that exhibit radionuclides above the proposed Tier II action level will also be returned to the excavation. They will be deposited in a specific area of the trench and will be underlain, and overlain, by a geotextile fabric or similar material for the purpose of demarcating these soils should re-excavation be deemed necessary at some point. The soils will be covered with topsoil and their location will be recorded, again to facilitate re-excavation if necessary.

In taking this action, RFFO recognizes, per the May 30, 1996, letter agreement governing this project, that use of the Tier I action level as a "putback" level is temporary, pending final resolution of the soil action level framework. RFFO also recognizes that if lower values are eventually agreed to as soil action levels, these soils may need to be removed and addressed in future remedial actions, consistent with the final soil action levels.

Consistent with our letter agreement of May 30, RFFO believes that this action is reasonable based upon the following:

• volatile organic contaminants, and not radionuclides, were the focus of this remedial action, and they have been successfully removed from the soils in question (these soils would not have been removed on the basis of radiological content alone);

• all soils proposed for return to the excavation conform to the proposed Tier I soil action limit;

• some immediate action is required to place the soils in a more stable configuration in order to minimize the need for ongoing management and to minimize the possibility of dispersal of the material;

• this action is cost effective as compared to on-site storage (estimated at $13,000 per month, primarily for rental of roll-off storage containers) and off-site disposal (estimated at $130,000, plus interim storage costs while awaiting shipment);

• this action poses no substantial environmental risk. Placing these soils back in the excavation and covering them with soil minimizes the likelihood of contaminant migration, and we regard this as an environmentally beneficial action as compared with storing the soil in a stockpile; and,

• should the decision ultimately be made to allow these soils to remain in the excavation, this will be consistent with anticipated land use. While the soils do contain somewhat higher levels of radionuclides than the other soils returned to the excavation, their radiological levels are below the proposed Tier I values for office worker and future residential exposure. Additionally, these soils contain lower radionuclide levels than are anticipated to remain following remediation at the nearby 903 Pad and Lip area.

The agreement of the Dispute Resolution Committee of August 22, 1996, was that put-back level decisions should be project specific, and made and explained within the decision documents associated with those actions. The agreement also specified that Decision factors to be considered include protectiveness and effectiveness, anticipated future land uses, contaminant levels in surrounding soils, and costs. Although agreement on specific put-back levels was agreed on May 30, we believe that we are also meeting the spirit of the August 22nd agreement.

I acknowledge your belief that due to the site specific conditions at Trench T3, that the contaminants being replaced above the Tier II levels may need to be revisited in the future. We are confident that the manner in which the soils are being replaced will not preclude such an action.

Thank you for your assistance in resolving this issue. Please call me at 966-4839 if you have any questions.

Sincerely,

Steve Slaten
RFCA Project Coordinator

Enclosures

cc w/o enc:
H. Roitman, CDPHE
C. Spreng, CDPHE
S. Tarlton, CDPHE
M. Dodson, USEPA Region VIII
L. Johnson, USEPA Region VIII
K. Korkia, Citizens' Advisory Board
D. Butterfield, RFLII
K. Schnoor, City of Broomfield
R. Lightner, EM-40, HQ
C. Gesalman, EM-40, HQ
J. Roberson, OOM, RFFO
K. Klein, OOM, RFFO
J. Legare, AMEC, RFFO
S. Olinger, PPI, RFFO
J. Rampe, PLD, RFFO
D. Lindsay, OCC, RFFO

APPENDIX B
TRENCHES T-3 AND T-4 EXCAVATION VERIFICATION SUMMARY

T-3/T-4 SAMPLE RECORD											
Trench Verification Samples											
T-3 7/9/96											
	Contaminant Concentration (ppm unless otherwise stated)										
	(levels listed are excavation cleanup standards)										
Sample #	1,1,1 TCA (378 ppm)	1,1-DCE (11.9 ppm)	1,2-DCA (6.33 ppm)	1,2-DCE (9.51 ppm)	Carbon Tet (11 ppm)	Chloroform (152 ppm)	Ethylbenzene (1760 ppm)	PCE (11.5 ppm)	Toluene (2040 ppm)	TCE (9.27 ppm)	Comments
TR00001RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00002RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00003RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	split
TR00004RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00005RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00006RM	BQL	BQL	BQL	BQL	1.8	BQL	BQL	1.2	BQL	BQL	
TR00007RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00008RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00009RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.74	BQL	BQL	
TR00010RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00011RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00012RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00013RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	6.3	BQL	BQL	
TR00014RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00015RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00016RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00017RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	duplicate
TR00018RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	8	BQL	BQL	rinsate (ug/L)

T-4 7/31/96											
	Contaminant Concentration (ppm unless otherwise stated)										
	(concentrations listed are excavation cleanup standards)										
Sample #	1,1,1 TCA (378 ppm)	1,1-DCE (11.9 ppm)	1,2-DCA (6.33 ppm)	1,2-DCE (9.51 ppm)	Carbon Tet (11 ppm)	Chloroform (152 ppm)	Ethylbenzene (1760 ppm)	PCE (11.5 ppm)	Toluene (2040 ppm)	TCE (9.27 ppm)	Comments
TR00021RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00022RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00023RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00024RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00025RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00026RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	10	BQL	BQL	
TR00027RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	split
TR00028RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00029RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	25	BQL	6.3	
TR00030RM	91	BQL	BQL	BQL	16	12	3.9	120	41	100	
TR00031RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00032RM	13	BQL	BQL	BQL	1.2	1.1	BQL	33	2.5	29	
TR00033RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	2.3	BQL	1.1	
TR00034RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00035RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00036RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00037RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	duplicate
TR00038RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	rinsate (ug/L)
TR00039RM											trip blank
TR00040RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00041RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	100	BQL	BQL	
TR00042RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	100	BQL	2.7	
TR00043RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00044RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00045RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00046RM	0.7	BQL	BQL	BQL	1.6	2.4	BQL	10	BQL	30	
TR00047RM	BQL	BQL	BQL	BQL	BQL	2.2	BQL	0.7	BQL	6.5	
TR00048RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00049RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00050RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
TR00051RM	BQL	BQL	BQL	BQL	BQL	1.3	BQL	8.6	BQL	26	
TR00052RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.1	BQL	4.2	
TR00053RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	22	
TR00054RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.66	BQL	5.9	
TR00055RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	

APPENDIX C
TRENCHES T-3 AND T-4
PROCESS VERIFICATION SAMPLES SUMMARY

T-3/T-4 PV PERFORMANCE PER PAM														
			Contaminant Concentration (ppm unless otherwise stated)											
			(concentrations listed are TDU cleanup standards)											
			(Split samples shipped to Quanterra, St. Louis)											
Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
1	1	PV00005RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00006RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00004RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00001RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00002RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00003RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2	1	PV00024RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00010RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00007RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00011RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00008RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00009RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3	1	PV00018RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	2.8	BQL	BQL	
	2	PV00016RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	2.7	BQL	BQL	
	3	PV00012RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00017RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00013RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	4.4	BQL	BQL	
	6	PV00014RM	BQL	BQL	BQL	BQL	BQL	0.63	BQL	BQL	BQL	14	BQL	1.3	
4	1	PV00026RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.1	BQL	BQL	
	2	PV00027RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.2	BQL	BQL	
	3	PV00015RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.1	BQL	BQL	
	4	PV00019RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
		PV00028RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00023RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.5	BQL	BQL	
	6	PV00020RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	5.1	BQL	BQL	
	(split)	PV00020RM													
	(dup)	PV00021RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	3.8	BQL	BQL	
	(rns)	PV00022RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	(tb)	PV00033RM	BQL	BQL	BQL	BQL	32	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
5	1	PV00041RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	4.7	BQL	BQL	
	2	PV00042RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1	BQL	BQL	
	3	PV00025RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	10	BQL	1	
	4	PV00038RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00029RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00032RM	BQL	BQL	BQL	BQL	1.4	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6	1	PV00046RM	BQL	BQL	BQL	BQL	14	BQL	BQL	BQL	BQL	10	BQL	BQL	
	2	PV00047RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.9	BQL	BQL	

Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
	3	PV00040RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	4	BQL	0.76	
	4	PV00043RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.86	BQL	BQL	
	5	PV00044RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.86	BQL	BQL	
	6	PV00045RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	4	BQL	BQL	
7	1	PV00057RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00056RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00048RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	3	BQL	BQL	
	4	PV00049RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00050RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	3.2	BQL	BQL	
	6	PV00051RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	26	BQL	BQL	
8	1	PV00052RM	BQL	BQL	BQL	BQL	1.7	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00058RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00053RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.9	BQL	BQL	
	4	PV00059RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00054RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00055RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00055RM	BQL	BQL	BQL	0.01	6	BQL	BQL	BQL	BQL	0.14	BQL	BQL	
	(dup)	PV00072RM	BQL	BQL	BQL	BQL	1.4	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00073RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	(tb)	PV00074RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
9	1	PV00060RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00061RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.78	BQL	BQL	
	3	PV00062RM	BQL	BQL	BQL	BQL	5.5	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00063RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00064RM	BQL	BQL	BQL	BQL	1.6	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00065RM	BQL	BQL	BQL	BQL	1.2	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
10	1	PV00066RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00067RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(dup)	PV00106RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.4	BQL	BQL	
	(rns)	PV00107RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	3	PV00068RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00069RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00070RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00071RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
11	1	PV00075RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00076RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00077RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00078RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00079RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00080RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
12	1	PV00081RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	2.6	BQL	BQL	

Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
	2	PV00082RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00083RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00084RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00085RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00086RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
13	1	PV00087RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00088RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00089RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00090RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00091RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00092RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
14	1	PV00093RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.78	BQL	BQL	
	2	PV00094RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00095RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00096RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00097RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00098RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.6	BQL	BQL	
15	1	PV00099RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	2	BQL	BQL	
	2	PV00100RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.5	BQL	BQL	
	3	PV00101RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00102RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	5	PV00103RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	6	PV00104RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
16	1	PV00109RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00110RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00105RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00112RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	2.6	BQL	BQL	
	5	PV00108RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
17	1	PV00114RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.74	BQL	BQL	
	(split)	PV00114RM	BQL	BQL	BQL	0.01	0.06	BQL	BQL	BQL	0.03	0.71	BQL	0.02	
	(dup)	PV00137RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00138RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	(tb)	PV00139RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	2	PV00115RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00113RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.66	BQL	BQL	
	4	PV00118RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1.2	BQL	BQL	
18	1	PV00119RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00121RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00123RM	BQL	BQL	BQL	BQL	1.8	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00126RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.78	BQL	BQL	
19	1	PV00127RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	

Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
	2	PV00128RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	3	PV00129RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00125RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
20	3	PV00131RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00136RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
21	3	PV00141RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
22	3	PV00147RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
23	1	PV00151RM	BQL	BQL	BQL	BQL	3.5	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
24	1	PV00153RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	2	PV00152RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	7.7	BQL	BQL	
	3	PV00154RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	4	PV00155RM	BQL	BQL	BQL	BQL	5.1	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
25	2	PV00156RM	BQL	BQL	BQL	BQL	3.3	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
26	3	PV00157RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
27	4	PV00158RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00158RM	BQL	BQL	BQL	BQL	2.7	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(dup)	PV00171RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	9.3	BQL	BQL	
	(rns)	PV00172RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
28	1	PV00159RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
29	2	PV00160RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
30	3	PV00161RM	BQL	BQL	BQL	BQL	1.4	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
31	4	PV00162RM	BQL	BQL	BQL	BQL	1.4	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
32	1	PV00163RM	BQL	BQL	BQL	BQL	1.7	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
33	6	PV00164RM	BQL	BQL	BQL	BQL	2.1	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
34	5	PV00165RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.71	BQL	BQL	
35	2	PV00166RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
36	3	PV00167RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
Oven #/ Run#	Load #														
1-37	4	PV00168RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-37	3	PV00169RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00169RM	BQL	BQL	BQL	BQL	1.9	BQL	BQL	BQL	BQL	0.02	BQL	BQL	
	(tb)	PV00197RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00198RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	(dup)	PV00199RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-37	4	PV00170RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-37	3	PV00173RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-37	4	PV00174RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-37	3	PV00175RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-38	3	PV00176RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	

APPENDIX D
TRENCHES T-3 AND T-4
RADIONUCLIDE SAMPLE ANALYSIS SUMMARY

GAMMA SPECTROSCOPY ANALYSIS
TRENCH T-3 SOIL

Sample Number	Net Weight (g)	Activity (picoCuries)					Concentration (picoCuries/gram)				
		U-234 (a)	U-235 (b)	U-238	Am-241 (c)	Pu-239/240	U-234	U-235	U-238	Am-241	Pu-239/240
SS01001RM	299.00	1,249.60	222.00	4,410.00	250.00	1,250.00	4.18	0.74	14.75	0.84	4.18
SS01002RM	352.00	1,249.60	270.00	9,650.00	470.00	2,350.00	3.55	0.77	27.41	1.34	6.68
SS01003RM	259.00	1,249.60	304.00	9,240.00	360.00	1,800.00	4.82	1.17	35.68	1.39	6.95
SS01004RM	326.00	1,249.60	384.00	13,800.00	620.00	3,100.00	3.83	1.18	42.33	1.90	9.51
SS01005RM	333.00	1,249.60	298.00	10,500.00	290.00	1,450.00	3.75	0.89	31.53	0.87	4.35
SS01006RM	273.00	1,249.60	328.00	18,000.00	310.00	1,550.00	4.58	1.20	65.93	1.14	5.68
SS01007RM	276.00	1,249.60	334.00	10,900.00	430.00	2,150.00	4.53	1.21	39.49	1.56	7.79
SS01008RM	318.00	1,249.60	218.00	4,550.00	240.00	1,200.00	3.93	0.69	14.31	0.75	3.77
SS01009RM	324.00	1,249.60	212.00	7,710.00	450.00	2,250.00	3.86	0.65	23.80	1.39	6.94
SS01010RM	302.00	1,249.60	117.00	2,420.00	4.07	20.35	4.14	0.39	8.01	0.01	0.07
SS01011RM	314.00	1,249.60	118.00	2,130.00	4.07	20.35	3.98	0.38	6.78	0.01	0.06
SS01012RM	283.00	1,249.60	161.00	2,160.00	4.07	20.35	4.42	0.57	7.63	0.01	0.07
SS01013RM	346.00	1,249.60	183.00	1,390.00	4.07	20.35	3.61	0.53	4.02	0.01	0.06
SS01014RM	286.00	1,249.60	133.00	3,610.00	4.07	20.35	4.37	0.47	12.62	0.01	0.07
SS01015RM	301.00	1,249.60	3.24	2,630.00	4.07	20.35	4.15	0.01	8.74	0.01	0.07
SS01016RM	353.00	1,249.60	172.00	2,340.00	4.07	20.35	3.54	0.49	6.63	0.01	0.06
SS01017RM	350.00	1,249.60	237.00	3,930.00	230.00	1,150.00	3.57	0.68	11.23	0.66	3.29
SS01018RM	364.00	1,249.60	479.00	29,400.00	1,500.00	7,500.00	3.43	1.32	80.77	4.12	20.60
MEAN	314.39	1,249.60	231.85	7,709.44	287.69	1,438.47	4.01	0.74	24.52	0.92	4.58
				STANDARD DEVIATION			0.41	0.36	21.67	1.03	5.16
				0.95 CONFIDENCE INTERVAL			0.19	0.17	10.01	0.48	2.38
				CONC (MEAN + 0.95 CONF INTERVAL)			4.20	0.90	34.53	1.39	6.96
				TIER I Value			2,042.00	136.80	613.90	229.00	2,001.00
				CONC / TIER I			0.00	0.01	0.06	0.01	0.00
				TIER II Value			360.40	24.10	108.30	40.40	353.20
				CONC / TIER II			0.01	0.04	0.32	0.03	0.02
				Sum of Ratios for TIER I		0.07					
				Sum of Ratios for TIER II		0.42					

(a): The Minimum Detectable Activity (MDA) value of the HPGe detector for U-234 was used for all samples due to no detectable activity of this isotope

(b): The MDA value of the HPGe detector for U-235 was used for sample SS01015RM due to no detectable activity for U-235 in this sample.

(c): The MDA value of the HPGe detector for Am-241 was used for samples SS01010RM-SS01016RM due to no detectable activity for Am-241 in these samples.

8/16/96, 9:22 AM

GAMMA SPECTROSCOPY ANALYSIS
TRENCH T-4 SOIL

Sample Number	Net Wt (g)	Activity (picoCuries)					Concentration (picoCuries/gram)				
		U-234 (a)	U-235 (b)	U-238	Am-241 (c)	Pu-239/240	U-234	U-235	U-238	Am-241	Pu-239/240
SS01035RM	342.69	1,249.60	335.00	15,600.00	637.00	3,185.00	3.65	0.98	45.52	1.86	9.29
SS01036RM	360.20	1,249.60	355.00	7,580.00	412.00	2,060.00	3.47	0.99	21.04	1.14	5.72
SS01037RM	376.04	1,249.60	249.00	10,800.00	375.00	1,875.00	3.32	0.66	28.72	1.00	4.99
SS01038RM	379.40	1,249.60	386.00	9,680.00	413.00	2,065.00	3.29	1.02	25.51	1.09	5.44
SS01039RM	395.20	1,249.60	205.00	4,240.00	288.00	1,440.00	3.16	0.52	10.73	0.73	3.64
SS01040RM	378.40	1,249.60	327.00	4,710.00	609.00	3,045.00	3.30	0.86	12.45	1.61	8.05
SS01041RM	332.94	1,249.60	216.00	5,640.00	4.07	20.35	3.75	0.65	16.94	0.01	0.06
SS01042RM	341.09	1,249.60	184.00	8,610.00	463.00	2,315.00	3.66	0.54	25.24	1.36	6.79
SS01043RM	359.21	1,249.60	3.24	3,870.00	4.07	20.35	3.48	0.01	10.77	0.01	0.06
SS01044RM	375.00	1,249.60	180.00	4,900.00	4.07	20.35	3.33	0.48	13.07	0.01	0.05
SS01045RM	331.25	1,249.60	196.00	5,410.00	4.07	20.35	3.77	0.59	16.33	0.01	0.06
SS01046RM	368.16	1,249.60	3.24	2,820.00	4.07	20.35	3.39	0.01	7.66	0.01	0.06
SS01047RM	358.70	1,249.60	140.00	3,820.00	4.07	20.35	3.48	0.39	10.65	0.01	0.06
SS01048RM	348.45	1,249.60	142.00	3,450.00	4.07	20.35	3.59	0.41	9.90	0.01	0.06
SS01049RM	346.00	1,249.60	3.24	2,970.00	4.07	20.35	3.61	0.01	8.58	0.01	0.06
SS01050RM	369.06	1,249.60	180.00	5,330.00	4.07	20.35	3.39	0.49	14.44	0.01	0.06
SS01051RM	388.80	1,249.60	203.00	8,650.00	316.00	1,580.00	3.21	0.52	22.25	0.81	4.06
SS01052RM	331.86	1,249.60	240.00	7,460.00	330.00	1,650.00	3.77	0.72	22.48	0.99	4.97
SS01053RM	374.60	1,249.60	189.00	6,410.00	4.07	20.35	3.34	0.50	17.11	0.01	0.05
SS01054RM	354.09	1,249.60	3.24	3,640.00	4.07	20.35	3.53	0.01	10.28	0.01	0.06
MEAN	360.56	1,249.60	187.00	6,279.50	194.39	971.94	3.48	0.52	17.48	0.54	2.68
STANDARD DEVIATION							0.19	0.32	9.11	0.64	3.21
95% UCL							3.55	0.64	21.01	0.78	3.92
TIER I Value							2,042.00	136.80	613.90	229.00	2,001.00
CONC / TIER I							0.00	0.00	0.03	0.00	0.00
TIER II Value							360.40	24.10	108.30	40.40	353.20
CONC / TIER II							0.01	0.03	0.19	0.02	0.01

Sum of Ratios for TIER I	0.05
Sum of Ratios for TIER II	0.26

(a): The Minimum Detectable Activity (MDA) value of the HPGe detector for U-234 was used for all samples due to no detectable activity of this isotope.

(b): The MDA value of the HPGe detector for U-235 was used for samples SS01043, SS01046, SS01049, and SS01054 due to no detectable activity for this isotope.

(c): The MDA value of the HPGe detector for Am-241 was used for samples SS01041, SS01043 through SS01050, SS01053, and SS01054 due to no detectable activity for this isotope.

S. L. Garner
RST-016-96
Attachment 1

GAMMA SPECTROSCOPY ANALYSIS
T3/T4 SOIL > 5000 CPM ON THE FIDLER

Sample Number	Weight (g)	Activity (picoCuries)					Concentration (picoCuries/gram)				
		U-234 (a)	U-235	U-238	Am-241	Pu-239/240	U-234	U-235	U-238	Am-241	Pu-239/240
SS01019RM	376 33	1,249.60	397.00	13,700.00	439.00	2,195.00	3 32	1 05	36.40	1.17	5.83
SS01020RM	394 10	1,249.60	490.00	20,900.00	449.00	2,245.00	3.17	1.24	53.03	1.14	5.70
SS01021RM	393 10	1,249.60	405.00	12,600.00	579.00	2,895.00	3.18	1.03	32.05	1.47	7.36
SS01022RM	392.20	1,249.60	753.00	40,700.00	332.00	1,660.00	3.19	1.92	103.77	0.85	4.23
SS01023RM	374.73	1,249.60	403.00	15,300.00	269.00	1,345.00	3 33	1.08	40.83	0.72	3.59
SS01024RM	373.13	1,249.60	290.00	11,800.00	303.00	1,515.00	3.35	0.78	31.62	0.81	4.06
SS01025RM	396.40	1,249.60	991.00	57,300.00	497.00	2,485.00	3 15	2.50	144.55	1.25	6.27
SS01026RM	399 70	1,249.60	577.00	30,700.00	365.00	1,825.00	3.13	1.44	76.81	0.91	4.57
SS01027RM	329 51	1,249.60	659.00	43,000.00	583.00	2,915.00	3 79	2.00	130.50	1 77	8.85
SS01028RM	340.37	1,249.60	1,480.00	93,600.00	815.00	4,075.00	3.67	4.35	274.99	2.39	11.97
SS01029RM	295 73	1,249.60	1,700.00	106,000.00	921.00	4,605.00	4 23	5 75	358.44	3.11	15.57
SS01030RM	325.56	1,249.60	926.00	59,000.00	419.00	2,095.00	3.84	2.84	181.23	1.29	6.44
SS01031RM	286 86	1,249.60	1,520.00	84,100.00	536.00	2,680.00	4 36	5 30	293.17	1.87	9.34
SS01032RM	331 96	1,249.60	917.00	49,400 00	763.00	3,815.00	3 76	2.76	148 81	2.30	11.49
SS01033RM	323.82	1,249 60	984.00	48,500.00	400.00	2,000 00	3 86	3 04	149 77	1 24	6.18
SS01034RM	358.83	1,249.60	1,670.00	62,400.00	448.00	2,240.00	3 48	4.65	173.90	1.25	6.24
MEAN	355 77	1,249 60	885.13	46,812 50	507.38	2,536 88	3 55	2 61	139 37	1 47	7.36
STANDARD DEVIATION							0 39	1.62	99.79	0.66	3.31
95% UCL							3 72	3.32	183 10	1.76	8.81
TIER I Value							2,042 00	136.80	613.90	229.00	2,001.00
CONC / TIER I							0 00	0.02	0 30	0.01	0.00
TIER II Value							360 40	24.10	108 30	40.40	353.20
CONC / TIER II							0 01	0 14	1 69	0 04	0.02

Sum of Ratios for TIER I	0.34
Sum of Ratios for TIER II	1 91

(a) The Minimum Detectable Activity (MDA) value of the HPGe detector for U-234 was used for all samples due to no detectable activity of this isotope.

Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
1-38	6	PV00213RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-38	4	PV00177RM	BQL	BQL	BQL	BQL	6	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-38	3	PV00178RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-38	4	PV00179RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-38	5	PV00212RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-38	3	PV00180RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00180RM	BQL	BQL	BQL	0.02	BQL	BQL	BQL	BQL	0.01	BQL	BQL	BQL	
	(tb)	PV00181RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	(dup)	PV00182RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00183RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
6-38	4	PV00184RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-39	4	PV00185RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-39	3	PV00186RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-39	4	PV00187RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-39	2	PV00188RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-39	4	PV00189RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-39	3	PV00190RM	BQL	BQL	BQL	BQL	5.6	BQL	BQL	BQL	BQL	3.7	BQL	BQL	
1-40	3	PV00191RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-40	4	PV00192RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-40	3	PV00193RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-40	5	PV00194RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-40	3	PV00195RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-40	4	PV00196RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-41	4	PV00197RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-41	1	PV00335RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-41	3	PV00198RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-41	4	PV00199RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-41	3	PV00200RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-41	3	PV00201RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-42	3	PV00203RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-42	4	PV00204RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00204RM	BQL	BQL	BQL	0.01	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(tb)	PV00205RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	(dup)	PV00206RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00207RM	BQL	BQL	BQL	BQL	0.19	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
4-42	4	PV00209RM	BQL	BQL	BQL	BQL	3.6	BQL	BQL	BQL	BQL	0.63	BQL	BQL	
2-43	1	PV00231RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-43	1	PV00233RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
Start of T-4 Treatment															
1-44	3	PV00236RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	

Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
2-44	4	PV00237RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-44	3	PV00238RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-44	4	PV00239RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-44	3	PV00240RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-44	4	PV00241RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-45	2	PV00242RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-45	3	PV00243RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00243RM	BQL	BQL	BQL	0.31	3.5	BQL	BQL	BQL	BQL	0.02	0.01	BQL	
	(tb)	PV00244RM													
	(dup)	PV00245RM	BQL	BQL	BQL	BQL	6.5	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00246RM	BQL	BQL	BQL	BQL	18	BQL	43	BQL	BQL	BQL	BQL	BQL	ug/L
3-45	1	PV00247RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-45	4	PV00249RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-45	3	PV00250RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
RAD SOIL															
1-46	3	PV00251RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-46	4	PV00252RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-46	3	PV00253RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-46	4	PV00254RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-46	3	PV00255RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-46	4	PV00256RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-47	4	PV00257RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-47	3	PV00258RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-47	4	PV00259RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-47	3	PV00260RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-47	4	PV00261RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-47	3	PV00262RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-48	3	PV00263RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-48	4	PV00264RM	BQL	BQL	BQL	BQL	2.3	BQL	BQL	BQL	BQL	1.7	BQL	BQL	
3-48	3	PV00265RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-48	4	PV00266RM*	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00266RM	BQL	BQL	BQL	0.02	BQL	BQL	BQL	BQL	BQL	0.01	BQL	BQL	
	(tb)	PV00267RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	3	BQL	BQL	BQL	ug/L
	(dup)	PV00268RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00269RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
5-48	3	PV00270RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-48	4	PV00271RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-49	4	PV00272RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-49	3	PV00273RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-49	4	PV00274RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	

Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
4-49	3	PV00275RM	BQL	BQL	BQL	BQL	3.6	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-49	3	PV00276RM	BQL	BQL	BQL	BQL	3.7	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-49	3	PV00277RM	BQL	BQL	BQL	BQL	3.6	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-50	3	PV00278RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-50	4	PV00279RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-50	3	PV00280RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-50	4	PV00281RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-50	3	PV00282RM	BQL	BQL	BQL	BQL	4.3	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-50	4	PV00283RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-51	4	PV00284RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-51	3	PV00285RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-51	2	PV00286RM	BQL	BQL	BQL	BQL	2.1	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-51	3	PV00287RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-51	4	PV00288RM	BQL	BQL	BQL	BQL	5.2	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-51	3	PV00289RM*	BQL	BQL	BQL	BQL	3.3	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00289RM	BQL	BQL	BQL	BQL	1	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(tb)	PV00290RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(dup)	PV00291RM	BQL	BQL	BQL	BQL	2.9	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rns)	PV00292RM	BQL	BQL	BQL	BQL	11	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
1-52	3	PV00293RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-52	4	PV00294RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-52	3	PV00295RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-52	4	PV00296RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-52	3	PV00297RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-52	5	PV00298RM	BQL	BQL	BQL	BQL	2	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-53	3	PV00305RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-53	3	PV00300RM	BQL	BQL	BQL	4.4	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-53	3	PV00307RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-53	3	PV00302RM	BQL	BQL	BQL	9.3	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-53	4	PV00303RM	BQL	BQL	BQL	BQL	3.4	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-53	3	PV00304RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-54	1	PV00299RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-54	4	PV00306RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-54	1	PV00301RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-54	4	PV00308RM	BQL	BQL	BQL	BQL	2.6	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
5-54	3	PV00309RM	BQL	BQL	BQL	BQL	1.4	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
6-54	1	PV00310RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-55	4	PV00311RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-55	3	PV00312RM	BQL	BQL	BQL	BQL	6.7	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(split)	PV00312RM	BQL	BQL	BQL	0.01	4.7	BQL	BQL	BQL	0.18	BQL	BQL	BQL	

Batch #	Oven #	Sample#	1,1,1 TCA (6.0 ppm)	1,1-DCE (6.0 ppm)	1,2-DCA (6.0 ppm)	Benzene (10 ppm)	Acetone (160 ppm)	Carbon Tet (6.0 ppm)	Chloroform (6.0 ppm)	Ethylbenzene (10 ppm)	Methylene Chloride (30 ppm)	PCE (6.0 ppm)	Toluene (10 ppm)	TCE (6.0 ppm)	Comments
	(tb)	PV00290RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
	(dup)	PV00314RM	BQL	BQL	BQL	BQL	8.7	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
	(rms)	PV00315RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	ug/L
3-55	4	PV00316RM	BQL	BQL	BQL	BQL	1	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-55	3	PV00317RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-56	3	PV00320RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-56	4	PV00321RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-56	3	PV00322RM	BQL	BQL	BQL	BQL	2.2	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-56	4	PV00323RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-57	4	PV00326RM	BQL	BQL	BQL	BQL	2	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-57	3	PV00327RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
3-57	4	PV00328RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
4-57	3	PV00329RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
1-58	1	PV00332RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	
2-58	1	PV00333RM	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	